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Anapedia – An Open Web-based Encyclopedia for Indonesian Children

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Abstract

Background: The limited number of web and child applications becomes a challenge especially providing web or education app that can be a source of information referral to help the school task, especially for the needs of children in Indonesia.
Objective: This study answers the challenge by designing a special encyclopedia for children called *Anapedia,* an open web-based encyclopedia for children.
Methods: *Anapedia* designed for the quality of content for education and design for entertainment that is suitable for children's needs by considering the children cognitive abilities.
Results: The features are full-color, simple layout, large font sizes, and simple language with illustrated drawing to make it easier. For maintain the quality of the articles, this app involves the educator as a contributor who have better understand the characteristic and need of school-level children. This also provided a search feature based on keywords using information retrieval system with spell checker.
Conclusion: The results of testing result with Black Box Method, it can be concluded that the entire system being tested has been functioning properly in accordance with expectations.

I. INTRODUCTION

Children are age groups that need a great deal of attention in terms of education. From the release of the Ministry of Education and Culture Indonesia in 2017 revealed that the number of school-aged children ranging from kindergarten to senior high school level has more than 49 million students [1]. Based on the research [2] was conducted by the Ministry of Communications and Informatics supported by UNICEF in Digital Citizenship Safety program in 2014, that analyzed online activities and behavior among children and adolescents. That study covers the age group of 10 to 19 years, a large population of 43.5 million children and adolescents, taking samples of 400 respondents aged 10 to 19 years, obtained the highest results of 80% of respondents using the internet to search for data and information, especially for schoolwork. From observations made by researchers noted that the number of web or child apps is still limited, especially applications that support school learning in Indonesia. It is a challenge to be able to provide web or child apps that could be a source of information to support learning activities.
According to Untoro, Encyclopedia is a number of writings containing explanations of information from one or all branches of science composed of articles with one topic of discussion on each article that is arranged alphabetically or by category [3]. Based on these definitions, then the encyclopedia is very appropriate if used as a source of data and information for children. One of the popular encyclopedia is Wikipedia†. Wikipedia is an Open Web-based Encyclopedia that has successfully become an Open Content Project that can be written, edited, copied, distributed, and fully maintained by thousands of volunteers or contributors [4]. In America, Wikipedia is a reference for children and adolescents in school work [5]. It is sounds good to Wikipedia that can be a referral center. But not for kids, because Wikipedia is actually targeted to general users not for children. So from the content and design is not suitable for children. Some articles written on Wikipedia pages are, for example, complex and not easy to understand [6]. Mostly use formal delivery languages with high-level terms beyond the reach of children. This will certainly make it difficult for children to understand. Because the perception and knowledge of children is different. They perceive the world differently from adults [7][8]. In

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addition, Wikipedia design interface is only dominance with white and black colors. This is reasonable because wikipedia is not designed specifically for children. So it is not interesting for children because there are not many color combinations. Though designs with many combinations of colour and images can provide stimulation for children [9].

In Indonesia, there are some encyclopedia designed specifically for children, i.e. [3][10][11][12]. The interface design is good with colors combination and animation, but that content still limited in specific topics such as vertebrate animals, the solar system, and astronomy. And for content updates still performed by admins. They do not involve contributors, so the diversity of content will be very limited to the admin knowledge. Though the encyclopedia involving contributors like Wikipedia has more diverse and quality-maintained content [4].

Considering the large number of school-age children, especially in Indonesia, who need access to information to look for data and information related to school work. This study aim to design an encyclopedia that supports education and entertainment for children. This encyclopedia is called *Anapedia*, an open web-based encyclopedia for children. *Anapedia* is designed with attention to the quality of content for education and design for entertainment that is suitable for children's needs by considering the cognitive abilities of very limited children. So it suitable as a source of study and information for Indonesia children.

II. METHODS

Applications specifically intended for children have their own challenges. The interface should support both educational and entertainment [13]. *Anapedia* is designed with attention to the quality of content for education and design for entertainment appropriate for the needs of children. The architecture of a web app *Anapedia* is shown in Fig. 1. *Anapedia* emphasizes the quality of the content and interface design that is suitable for children.

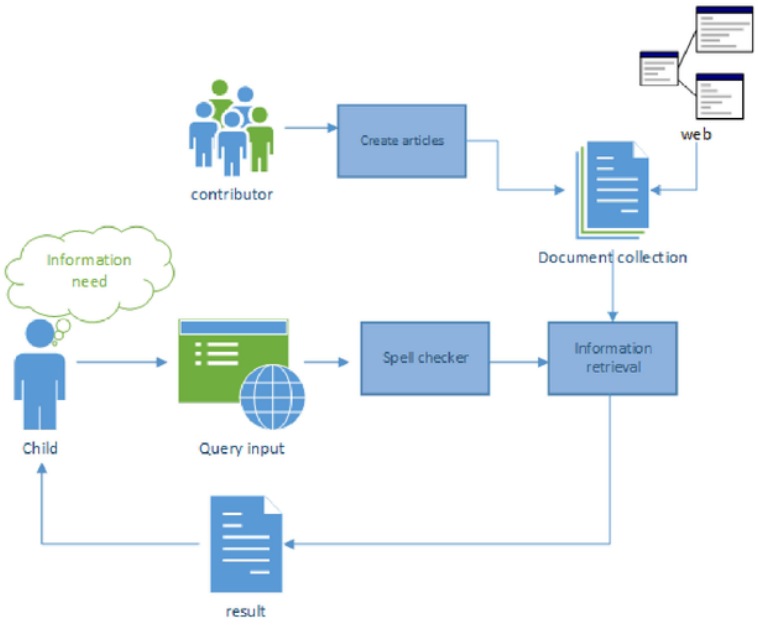

Fig. 1 The architecture of a web app Anapedia

Anapedia provides a search feature based on keywords using information retrieval system. One of the disadvantages of many search engines app for children is the lack of a spell checking mechanism [7]. Whereas in [14] said that a short queries indicate that young users may have difficulties with query formulation and finding the right terms. This makes it harder for children to find the right results. Thus, spelling correction and query suggestion mechanisms in keyword based search tools are important to help anticipate the misspellings of keywords entered by children [14][15][16]. Furthermore, a search system for children should provide different possibilities for children to formulate their information need. From Fig. 1, *Anapedia*'s users, in this case children could search the articles by entering a keyword (query input). Then system will automatically perform a spell checker to minimize spelling errors from keywords written by children. If the keyword entered does not match the list of words that exist in the database, it will be calculated proximity to the existing word in the

database. Levenstein Distance Algorithm was used to get keyword proximity. Based on the research we have done before, this algorithm has been able to fix the misspellings of keyword given by children with accuracy reaches 98% [17]. Through this spell checker system is expected to help overcome the weakness of children, especially for elementary school child who are still in the stage of introduction of literacy.

Fig. 1 show the collection of documents used in *Anapedia* taken from articles written by contributors (internal sources) and from the web (external sources). Next step, the document collection becomes input for the next process, the Information Retrieval (IR) system. This IR system will match between the keywords entered by the user with the document collection. Furthermore, the results of the IR system will be given to the user through a web page.

A. Quality Content Design

An app for children should have quality content that suits the needs of the children [7]. Anapedia is designed for children so that the content is also tailored to the needs of children. In an open web based encyclopedia, contributors have an important role in enriching the quantity and quality of content [4]. Anapedia contributor is specified for educator. Educator, including the teacher, who is the crucial factor in influencing the level of pupils' education [18]. Through the educators, the quality of the content is expected to be well maintained, in terms of material depth and language used in the delivery can be more easily tailored to the needs of children. From Fig. 2, we could be seen there are 2 actors involved in this app, i.e. child and contributor. The process of an *Anapedia*'s system is not only create articles that could be done by contributors, and searching articles by both actors. But there is a proses to rate articles that could be done between contributors to written articles. This is one of the method to control the articles quality.

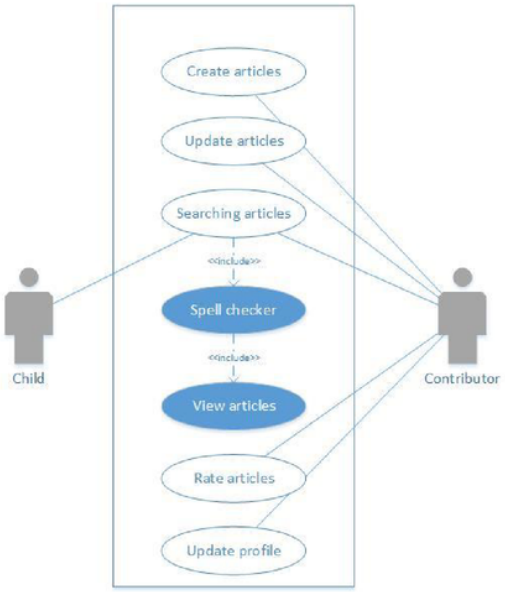

Fig. 2 Use case diagram of an app Anapedia

B. Interface Design for Children

The important thing in building applications for children is not only considering child-friendly content but it is also necessary to think of a child-friendly interface design [7]. For this reason, it is necessary to understand the character of children as important information to developing a system. *Anapedia* as an application intended for children has a user age specification. This app is intended for children aged 7-12 years, which is suitable for children of grade 1 to 6 elementary school in Indonesia. Where at this moment the children entered a concrete operational development period. This is based on the Piaget's theory which states that there are differences in the individual age group of human abilities [19]. According to [9][20] the design of applications for children and application design for different adults because their abbilities is different. The application design for children should consider factors such as: content conformity with child's age and design that can provide stimulation such as using multiple colour combinations and images.

III. RESULTS

The result of this research is an open web-based encyclopedia for children, which is named *Anapedia*. This app can be accessed on these URL address *www.anapedia.org*. The *Anapedia* web app was developed with framework Codeigniter 3 and MySQL Database. The following will be shown the results of the research that has been done as well as the results of the system testing.

The *Anapedia* web app is an encyclopedia application specifically designed for children especially for children aged 7-12 years. So it is design based on recommendations from the results of several studies, where applications for children should contain images and animation [19], large font sizes, simple text layouts for easy reading and large searching boxes [15]. The interface of *Anapedia* is designed with attention to these important points that are suitable for the needs of children. The Background image have full colour with images and animations. While a layout design was designed with a simple layout by minimizing menus and buttons. The font size is 14.5 pixels based on the size which was recommended in several studies, i.e. 14 pixels or more. Large font sizes with distances between lines will make it easier for children to read the text written on the application. The language in the article uses simple language with illustrated drawing to make it easier for children to understand what is explained in the article. The interface of *Anapedia* is simplified and colorfull background with spell corrections and using simple language and large font sizes. Table 1 shown the point of *Anapedia* design that has been adapted for the needs of children.

TABLE 1
ANAPEDIA INTERFACE DESIGN FOR CHILDREN

Feature	Anapedia design	Averment
Design	Based on graphics, animation, full colors background theme	Fig. 3, Fig. 4
Font size	14.5 pixels	Yes, All of page
Text layout	Simple layout	Fig. 7, Fig. 5
Size box	Large	Fig. 5
Spell checker	Yes, to correction keywords input	Fig. 6
Webpage open system	Same window	Fig. 7

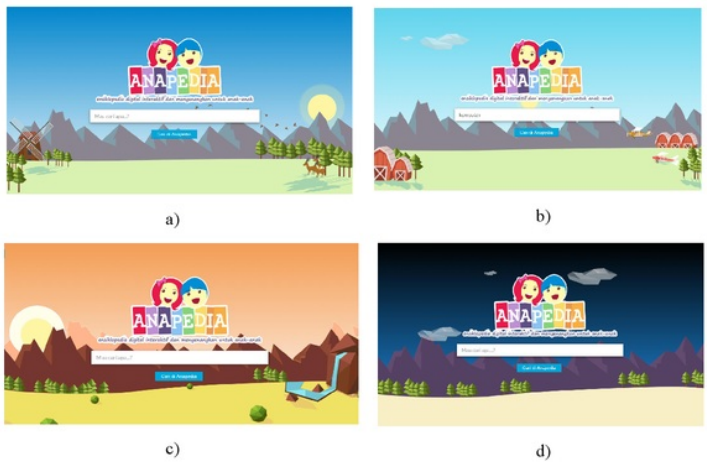

Fig. 3 Anapedia background theme (a) sunshine, (b) daylight, (c) sunset, (d) moonlight.

The background on the search page is used full colour background and theme images that change according to time. It is intended to stimulate children to learn about time that is presented in the background theme changes in every turn of time. The background theme is sunshine, daylight, sunset, and moonlight. Fig. 3 shown the variations of background theme. The theme will automatically change according to the time when the application is opened or accessed. For example, the sunshine theme will be shown on the background in the morning, while if evening then it will be shown the moonlight theme on the background. In each background theme on the start page there is *Anapedia* logo. The logo of *Anapedia* is depicted with two children representing girls and boys (e.g. Fig. 3). The icon of a girl is depicted as having pink hair, while the icon of a boy is depicted in blue hair. There is the inscription "ANAPEDIA" under the icon, which uses capital letters to make it clearly read especially for children. Each letter in text of *Anapedia* is given a colorfull background to make it look

cheerful. Under the icon there is a tagline that reads "*Ensiklopedia Digital Interaktif dan Menyenangkan untuk Anak-Anak*" (Interactive and Fun Digital Encyclopedia for Children, in English).

Anapedia's animation is located on the start page background, which is cloud and plane animation. Fig. 4 is screenshots that illustrate changes in object position of the cloud and planes. This is indicated by the difference between the first and second images. Where in Fig. 4b, the image shows the plane object on the right of house object. Whereas in Fig. 4a picture shows the plane object above the house object. This position change shows the movement of the object from right to left. Likewise with picture in Fig. 4c, we could see cloud objects above the windmill object. Whereas in Fig. 4d the picture shown that the cloud objects on the right of the windmill object. This proves the movement of cloud object from left to right.

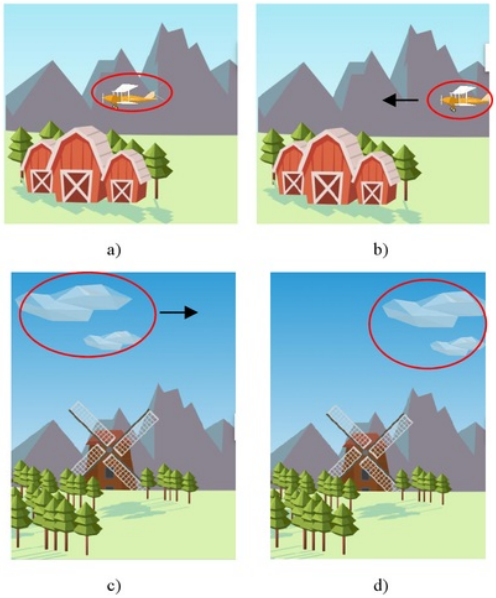

Fig. 4 The Animation of Background theme

On the start page there is a text box for searching articles below *Anapedia*'s logo. This text box is designs in large sizes and uses buttons that are also large with blue and striking to make it easier for children to type keywords. Start page is also designs with simple layout, there is only a column for searching without any headers and footers. So the children will be easy to see and focus on one process that is articles search (e.g. Fig. 5).

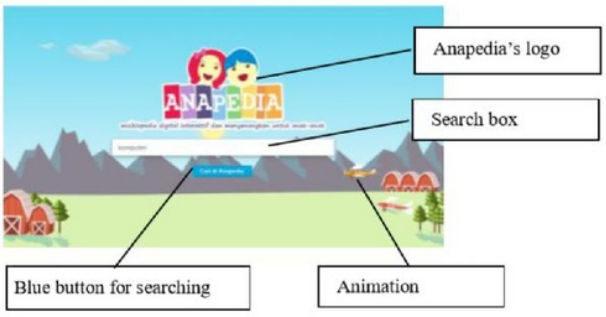

Fig. 5 Full colour start page of Anapedia

The search feature also comes with a spelling correction. So if there is a word error on the input typed by child, the spelling will be fixed automatically. Fig. 6 shown that the results of spelling correction by the system was already running. For example, keywords given is "squisi" from the correct word "squishy". When the blue button is clicked, the system automatically corrects the spelling by displaying the recommendation words that

are close to the entered keywords. The recommendation words for input keywords "squisi" are squeeze, squishy, and quis (indicated by the red circle on the right picture, e.g. Fig. 6). In the other article [17] we was discussed the experiment about spelling correction.

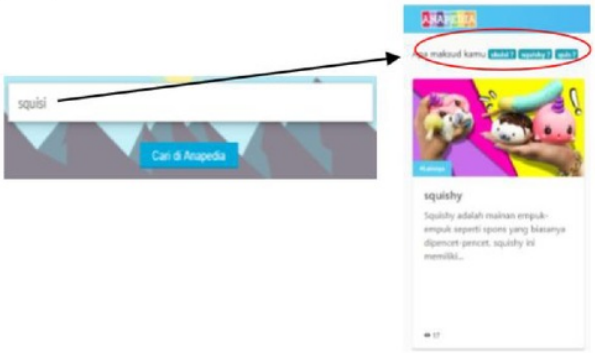

Fig. 6 Spelling checker automatically for searching feature

The recommendation words are displayed on the result page. While below the recommendation words there are results articles retrieved which close to the first word of the recommendation words. On the result page there are articles snipet from searching result (e.g. Fig. 7). The result page layout is displayed in a tile arranged vertically from top to bottom. Where a vertical row is filled with 4 column of articles snipet. The size of each column more wide so the children could access easier. Each article snippet column was contain an image and a piece of article content. To see the full articles contents the user just click on the article title (e.g. Fig. 7). When designing a search system for children, search results and links should not be opened in a new window [15]. Users can easily get confused or lost and start searching for the way back. We decided to open a webpage in the same window using a frame.

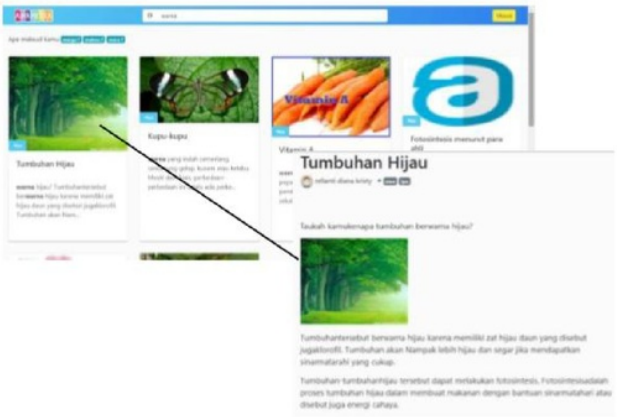

Fig. 7 The articles page

The web app *Anapedia* is an open web-based encyclopedia that designed with consider children needs. Like Wikipedia, where all articles contained in *Anapedia* is managed by contributors. For maintain the quality of the articles, *Anapedia* involves the educator as a contributor. Educators are chosen with the consideration that educator better understand the characteristic and need of school-level children. Unlike wikipedia, where an article is contribution from many contributors. *Anapedia* only allows an article to be written and edited by one contributor. This access was given to manage the quality of articles. So when there is an article whose content is not suitable for children it will be easier to track the author.

Any contributors can still provide feedback on articles written by other contributors by providing comments and providing a "like" rate. This feedback between contributors can control the quality of the written articles. Through the comment, a contributor could give input to the contents of the author's article written. In addition, to spur the spirit of contributors in writing articles (quantity) written by other contributors, each contributor will

have a "Score". Each contributor has a Score to assess how productive a contributor is. The Score is contributor rating which indicated how many articles are written and comment sent. This Score will increase every contributor to writing articles and comments sent on other written. If contributors are more actives so the higher points are obtained. Through these scores, it is expected to maintain the quality of the article and stimulate the productivity of *Anapedia* contributors. Table 2 shown the *Anapedia* privilege which is an advantage of an encyclopedia application for children.

TABLE 2
CHILDREN'S ENCYCLOPEDIA PRIVILEGE FEATURES OF ANAPEDIA

Feature	Anapedia privilege
Language	Simple, easy to understand for children
Contributor background	The Contributor of *Anapedia* is educator, so they better understood the content requirements that were appropriate for children.
Article – teacher relation	1 article written by 1 contributor to Make it Easier to browse the author's profile to maintain the quality of the content.
Interface	Colorfull background, simple layout, with image and animation.
Spell checker	Yes, adapted to the needs of children
Contributor rating	Yes, to trigger the quality and activeness of contributors.

System testing of *Anapedia* is done by testing system functionality. The test conducted is using the Black box method. This testing is done by developer which aims to determine system functionality. This test is conducted to ascertain whether all functions have been running properly in accordance with defined functional requirements [21]. The commonly scenario used of this test is to run all features, then observe every action given by the system to get conclusion of each features functionality. Testing is successful if features can operate as originally designed.

TABLE 3
BLACK BOX TESTING RESULT

Feature	Case and Testing			Result
	Input	Expectation	Output	
Searching	Input keywords in the search field then click the search button.	the search page will be displayed if the keyword matches the collection document.	Showing results as expected.	Accepted
Login dashboard	Use a username and password that has been registered.	Successfully entered the dashboard page if user-name and password correct.	The account is recognized and displays the page as expected.	Accepted
add articles	Select the New Post menu, then input all the fields provided.	Successfully added article.	The editor page appears to add a new article, and the article was successfully add-ed to the database.	Accepted
View articles	Select article which want to view then click the title.	Selected article can view-ed.	Showing results as expected.	Accepted
Background theme	Change the clock settings on the local computer.	Application background changes according to time.	Showing results as expected.	Accepted
Sign up for Contributor	Fill all fields in the register form.	Data is successfully regis-tered, and the account can be used to log in.	The result is successful to fill data as expected, data is sav-ed to database, and account can be used to log in.	Accepted

Table 3 is the result of application testing. From that table it can be seen that are 6 features that are tested, i.e. searching, login, add articles, view articles, background themes, and sign up as a contributor. Testing is done by the developer by giving input to each feature that is tested according to the case in the table. Furthermore, the action of the system is observed to be compared with the expected outcome. If the output and expectations are the same, it can be concluded that the feature function properly. The status of "accepted" in the result column indicate the success of the feature. From the sixth features tested for functionality, all showed positive results

because the six features have "accepted" status. So it can be concluded that the entire system being tested has been functioning properly in accordance with expectations.

IV. Discussion

From the testing result with Black Box method, it can be concluded that the entire system being tested has been functioning properly. However, the *Anapedia* is still web app is relatively new. While Black Box only used to know system fungsionality. So, it is required adaptation and support from users who will using this technology by knowing the level of readiness of users, especially for children aged 7-12 years. The method to measure a person's readiness level to new technology is Technology Readiness Index (TRI) [22]. This method has four exogenous variables that can significantly influence endogenous variables bound to Technology Readiness (TR). The exogenous variable consists of two variables with the user's positive perception of technology that can increase the TR level of the user, i.e. optimism and innovative. Two other exogenous variables are negative user perception, i.e. discomfort and insecurity. Positive variables (optimism and innovation) encourage people to use product or service technology and hold positive attitudes towards technology. Negative variables (inconvenience and insecurity) inhibit technology adoption by people. In the next research we will measure using the TRI method to find out how much the level of user readiness to this technology.

Anapedia is now equipped with comments and ratings features by contributors. This makes *Anapedia* more interactive and has a potential to be developed into a social network. Even though it's just used to give a positive suggestion to the articles written by other contributors. Based on research [23], according to the survey results, 76.3% of children from 6 years to 12 years use social networks. On the other side, social networks can increase pupils' engagement and motivation. This challenge is to provide a social network specifically for children. So we found an idea for further development by making information not only to be encyclopedia for children but it is very interesting to update it to be as socio-pedia, which a combination between encyclopedia & social network. So that not only contributors can interact, but users in this case can also interact with each other. And this is the concept of web 3.0, which the people are more connected altogether in the globe and work with communities outside their usual networks [24]. In addition, the current spell checker system still needs to be improved by adding query recommendation with orthogonal queries [25]. Through this process, we have shown that the searching and browsing experience for children have improved and help them more easily find results that match their information needs.

V. Conclusions

This research has built a web app *Anapedia*, the pilot research in open web-based encyclopedia for children, especially in Indonesia. This app designed with attention to the quality of content for education and design for entertainment that is suitable for children's needs, grade 1 to 6 elementary school, by considering the cognitive abilities of very limited children. The *Anapedia* features are full-color background image with animations, simple layout design by minimizing menus and buttons, large font sizes with distances between lines will make it easier to read the text written, and simple language with illustrated drawing to make it easier for children to understand what is explained in the article. This app also provides a search feature based on keywords using information retrieval system with spell checker to error spelling correction. For maintain the quality of the articles, it involves the educator as a contributor who has better understand the characteristic and need of school-level children. From result testing using the Black box method, it is obtained that the entire system being tested has been functioning properly in accordance with expectations.

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References

[1] Ministry of Education and Culture, "Ikhtisar Data Pendidikan Tahun 2016/2017," 2017.
[2] UNICEF Indonesia, "Pusat Media," *Unicef*, pp. 1–3, 2010.
[3] T. W. Untoro, R. Asmara, and Setiawardhana, "Aplikasi Ensiklopedia tentang Alam Semesta (Astronomi) Berbasis Multimedia untuk Anak-Anak," *EEPIS Final Proj.*, pp. 1–9, 2011.
[4] J. Schroer and G. Hertel, *Voluntary Engagement in an Open Web-Based Encyclopedia: Wikipedians and Why They Do It*, vol. 12, no. 1. 2009.
[5] Rainie and Tancer, "How students use Wikipedia," *Director*, no. April, pp. 1–7, 2007.

[6] T. Gossen, M. Kotzyba, and A. Nürnberger, "Knowledge Journey Exhibit : Towards Age-Adaptive Search User Interfaces," *Adv. Inf. Retr.*, pp. 781–784, 2015.
[7] T. Gossen and A. Nürnberger, "Specifics of information retrieval for young users: A survey," *Inf. Process. Manag.*, vol. 49, no. 4, pp. 739–756, 2013.
[8] R. S. Kraleva, "ChilDiBu – A Mobile Application for Bulgarian Children with Special Educational Needs," *Int. J. Adv. Sci. Eng. Inf. Technol.*, vol. 7, no. 6, pp. 2085–2091, 2017.
[9] W. Boswell, "Apps for Kids: Basic Usability Guidelines," *Intel Dev. Zo.*, pp. 1–3, 2013.
[10] M. E. Hutapea, "Rancang Bangun Ensiklopedia Sains untuk Anak Usia Dini berbasis Multimedia," Medan, 2014.
[11] F. M. Iwan Rijayana, "Apllkasi Ensiklopedia HewAn Vertebrata Berbasis Multimedia," *Sesindo - Jur. Sist. Inf. ITS*, pp. 143–150, 2010.
[12] Y. Tantriadi, "Pembuatan Ensiklopedia Interaktif Tata Surya Untuk Anak SMP Yonathan Tantriadi," *Calyptra J. Ilm. Mhs. Univ. Surabaya Vol. 2 No. 1*, vol. 2, no. 1, pp. 1–7, 2013.
[13] A. Large, J. Beheshti, and T. Rahman, "Design criteria for children's Web portals: The users speak out," *J. Am. Soc. Inf. Sci. Technol.*, vol. 53, no. 2, pp. 79–94, 2002.
[14] K. Collins-Thompson, P. N. Bennett, R. W. White, S. de la Chica, and D. Sontag, "Personalizing web search results by reading level," *Proc. 20th ACM Int. Conf. Inf. Knowl. Manag. - CIKM '11*, p. 403, 2011.
[15] J. Budiu, R., Nielsen, *Usability of Websites for Children: Design Guidelines for Targeting Users Aged 3-12 Years, 2nd edition*. Nielsen Norman Group Report, 2010.
[16] V. Kalsbeek *et al.*, "Automatic reformulation of children's search queries," 2010.
[17] N. Hayatin, "Implementasi Fitur Pencarian Dengan Koreksi Ejaan Menggunakan Levenshtein Distance Pada," pp. 132–136, 2016.
[18] J. Kubrický and P. Částková, "Teacher's Competences for the Use of Web Pages in Teaching as a Part of Technical Education Teacher's ICT Competences," *Procedia - Soc. Behav. Sci.*, vol. 174, pp. 3236–3242, 2015.
[19] S. Naidu and B. S. Chaparro, "Evaluating the Usability of Educational Websites for Children," *Softw. Usability Res. Lab. Wichita State Univ. Usability News*, vol. 7, no. 2, pp. 1–7, 2005.
[20] T. Gossen, M. Kotzyba, and A. Nürnberger, "Search Engine for Children: User-Centered Design," *Datenbank-Spektrum*, vol. 17, no. 1, pp. 61–67, 2017.
[21] A. Rouf, "Pengujian perangkat lunak dengan menggunakan metode white box dan black box," Semarang, 2012.
[22] Angraini, "pengukuran tingkat kesiapan penerapan e-learning menggunakan," *Sist. Inf*, vol. 5, pp. 237–241, 2015.
[23] V. Maněna, R. Dostál, and Š. Hubálovský, "Use of Social Networks and Mobile Technologies in Education," vol. 11, no. 3, pp. 512–515, 2017.
[24] R. Newman, V. Chang, R. J. Walters, and G. B. Wills, "Web 2.0 - The past and the future," *Int. J. Inf. Manage.*, vol. 36, no. 4, pp. 591–598, 2016.
[25] A. Wood, "Orthogonal Query Recommendations for Children," pp. 1–5, 2016.

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